

REMARKS

Status of the Claims

Claims 1, 2 and 20-39 are pending in this application, the independent claims being claims 1, 29 and 39. By this Amendment, the specification and claims 1, 2 and 20-38 are amended, and claim 39 is newly presented.

Summary of the Official Action

In the Official Action, the specification was objected to on formal grounds. Claims 20-22, 27 and 30 were rejected under 35 U.S.C. 112, second paragraph, as indefinite. Claims 1, 2, 20, 21, 23-26, 28 and 29 were rejected under 35 U.S.C. 102(b), as anticipated by U.S. Patent No. 6,481,115 (Henshaw); claims 1, 2, 20, 22 and 27 were rejected under 35 U.S.C. 102(e), as anticipated by U.S. Patent No. 6,612,048 (Peterlechner); claims 22, 29-36 and 38 variously were rejected under 35 U.S.C. 103(a), as unpatentable over the Henshaw '115 patent, alone or in view of U.S. Published Patent Application No. 2004/0211072 (Hertenberber); and claims 29, 32 and 37 were rejected under 35 U.S.C. 103(a), as unpatentable over the Peterlechner '048 patent in view of the Hertenberger '072 publication.

Reconsideration and withdrawal of the objection and rejections respectfully are requested in view of the above amendments and the following remarks.

Formal Amendments

Without conceding the propriety of the formal objection, the specification has been amended at page 2 to recite language corresponding to the features of original claim 1, as previously recited by reference thereto. No new matter has been added.

Claim Amendments

Initially, claim 30 has been amended to recite language inadvertently omitted from the original claim, as noted by the Examiner. Support for the amendment may be found in the original application. No new matter has been added.

The formal rejection of claims 20-22 and 27 and the rejections of the claims over the cited art respectfully are traversed. Nevertheless, without conceding the propriety of the rejections, claims 1, 2 and 20-38 have been amended to recite more clearly various novel features of the claimed invention, with particular attention to the Examiner's comments. Support for the amendments may be found in the original application; for example, with respect to amended independent claims 1 and 29, support may be found at page 6, lines 23-26 (wherein the specification discloses a flexible rotary scale deflected around a protrusion), page 7, lines 3-5 (wherein the specification discloses a flexible rotary ring stretched by pushing it onto a tapered surface) and page 8, lines 15-19 (wherein the specification discloses that a flexible, non-tapered, rotary ring is pushed over a tapered rotary part so as to stretch it). No new matter has been added.

With regard to the formal rejection of claims 20-22 and 27, Applicants submit that claim 20 does further limit claim 2. Claim 2 recites a structure including co-operating means on one or both of the rotary machine part and the rotary ring; claim 20 recites that the co-operating means is located on the rotary machine part (alone). Reconsideration and withdrawal of the formal rejection respectfully is requested.

Newly presented independent claim 39 has been added to provide Applicants with additional scope of protection commensurate with the disclosure. Support for claim 39 may be found in the original disclosure, e.g., at page 7, line 31 to page 8, line 13. For example, the feature of a locking taper is disclosed at page 8, lines 6-10 as having an angle of friction that is less than the coefficient of friction. No new matter has been added.

Claimed Invention

The present invention relates to a novel rotary ring for use in a scale reading apparatus, and a system for mounting a rotary ring for use in a scale reading apparatus. In one aspect, as recited in claim 1, the claimed invention relates to a rotary ring for use in a scale

reading apparatus, comprising a flexible ring having scale markings provided on a surface thereof, the flexible ring being sufficiently flexible to self-retain about a rotary machine part solely by elastic deformation of at least one portion thereof.

In another aspect, as recited in independent claim 29, the claimed invention relates to a method of mounting a flexible rotary scale onto a rotary machine part. The method comprises stretching or shrinking the flexible rotary scale onto the rotary machine part.

In another aspect, as recited in newly presented independent claim 39, the claimed invention relates to a system for mounting a flexible rotary ring for use in a scale reading apparatus onto a rotary machine part, comprising a flexible rotary ring having scale markings provided on a surface thereof, wherein a tapered surface is provided on one or both of the rotary machine part and the flexible rotary ring, and the taper angle of the tapered surface is sufficient to form a self locking taper.

In this aspect, the claimed invention provides a significant advantage over prior art structures in that no additional clamping structures/forces are required to secure the rotary ring and the rotary machine part together. (see, e.g., page 8, lines 6-10).

Prior Art Distinguished

Applicants submit that the prior art fails to anticipate the claimed invention. Moreover, Applicants submit that there are differences between the subject matter sought to be patented and the prior art, such that the subject matter taken as a whole would not have been obvious to one of ordinary skill in the art at the time the invention was made.

The Henshaw '115 patent relates to a scale reading apparatus, and discloses a system including a rotary ring attached to a rotary machine part. However, Applicants submit that the Henshaw '115 patent fails to disclose or suggest at least the above-discussed features of the claimed invention. Rather, in the Henshaw '115 patent, the rotary ring 3 is mounted on the rotary shaft 6 of a rotary machine part using mounting screws 8 secured into a shoulder 7

of the rotary machine part. (see, Fig. 5 and the written disclosure at column 2, lines 37-46). Nowhere does the Henshaw '115 patent disclose or suggest at least the features of a flexible ring being sufficiently flexible to self-retain about a rotary machine part solely by elastic deformation of at least one portion thereof, as disclosed in the present application and recited in claim 1. Nor does the Henshaw '115 patent disclose or suggest a method of mounting a rotary ring on a rotary machine part comprising stretching or shrinking the flexible rotary scale onto the rotary machine part, as disclosed in the present application and recited in independent claim 29. Nor does the Henshaw '115 patent disclose or suggest the feature of providing a tapered surface on one or both of the rotary machine part and the flexible rotary ring, where the taper angle of the tapered surface is sufficient to form a self locking taper, as disclosed in the present application and recited in new independent claim 39.

Applicants submit that the remaining prior art fails to remedy the deficiencies of the Henshaw 115 patent.

The Peterlechner '048 patent relates to an angular position measuring system, and discloses a system including a rotary ring structure attached to a rotary machine part; the rotary ring structure may be attached around a shaft 6 (Figs. 1, 2, 3a, 3b) or within a hollow shaft 13 (Fig. 4). The rotary ring structure includes a clamping ring 3, an elastic layer 2 (e.g., double sided acrylate-foam adhesive tape), and a measuring tape 1 (e.g., a graduated steel band 1). However, Applicants submit that the Peterlechner '048 patent fails to disclose or suggest at least the above-discussed features of the claimed invention. In one embodiment, the rotary ring structure comprises a clamping ring 3 including a clamping device 5 for constricting the rotary ring to clamp onto the body/shaft 6 (Fig. 1). In an alternative embodiment, the clamping device 5 expands the clamping ring 3 so as to radially engage the interior of a hollow shaft 13 by press fitting (Fig. 4). Nowhere does the Peterlechner '048 patent disclose or suggest at least the features of a flexible ring being sufficiently flexible to

self-retain about a rotary machine part solely by elastic deformation of at least one portion thereof, as disclosed in the present application and recited in claim 1. Nor does the Peterlechner '048 patent disclose or suggest a method of mounting a rotary ring on a rotary machine part comprising stretching or shrinking the flexible rotary scale onto the rotary machine part, as disclosed in the present application and recited in independent claim 29. Nor does the Peterlechner '048 patent disclose or suggest the feature of providing a tapered surface on one or both of the rotary machine part and the flexible rotary ring, where the taper angle of the tapered surface is sufficient to form a self locking taper, as disclosed in the present application and recited in new independent claim 39. Nor is the Peterlechner '048 patent understood to add anything to the Henshaw '115 patent that would make obvious the claimed invention.

Applicants submit that the remainin prior art of record fails to remedy these deficiencies of the Peterlechner '048 patent.

The Hertenberger '072 patent publication relates to an angle measuring instrument and procedure for the production of the angle measuring instrument, and discloses a rotary ring measuring system and method of making same. The rotary ring measuring structure includes a gradation support in the form of a flexible band having a scannable measuring gradation. However, Applicants submit that the Hertenberger '072 publication fails to disclose or suggest at least the above-discussed features of the claimed invention. Rather, in the Hertenberger '072 publication structure, a preassembled structural group comprising a mounting ring 2 and a positional support 3 is secured on a rotary machine part (drum 1). (see paragraph [0050] and Fig. 1A). The preassembled structural group 2,3 is disposed on and secured to the drum by slipping the structure axially over the machine part; a protrusion 25 of the mounting ring 2 engages a corresponding recess 15 in the drum 1 and the gradation support 3 engages a detent lug 13 on the drum. (see paragraph [0055]). In addition, adhesive

bonding, soldering or other suitable joining devices may be used. (see paragraph [0055]).

That is, the preassembled ring structure is secured using a recess and lug arrangement on the drum 1, and optionally using adhesive bonding, soldering or other suitable joining devices.

The Hertenberger '072 publication further discloses means for radially widening the mounting ring 2 to enable the graduation support 3 to be fixed in the mounting ring 2 (i.e., to thereby form the preassembled structural group comprising the mounting ring and graduation support). (see Figs. 3A and 3B and paragraphs [0064]-[0066]). The Hertenberger '072 publication further discloses that the mounting ring 2 can be widened by heating (see paragraph [0067]); however, Applicants submit that the Hertenberger '072 publication does not disclose heating the ring structure to shrink the structure onto a rotary machine part.

Nowhere does the Hertenberger '072 publication disclose or suggest at least the features of a flexible ring being sufficiently flexible to self-retain about a rotary machine part solely by elastic deformation of at least one portion thereof, as disclosed in the present application and recited in claim 1. Nor does the Hertenberger '072 publication disclose or suggest a method of mounting a rotary ring on a rotary machine part comprising stretching or shrinking the flexible rotary scale onto the rotary machine part, as disclosed in the present application and recited in independent claim 29. Nor does the Hertenberger '072 publication disclose or suggest the feature of providing a tapered surface on one or both of the rotary machine part and the flexible rotary ring, where the taper angle of the tapered surface is sufficient to form a self locking taper, as disclosed in the present application and recited in new independent claim 39. Nor is the Hertenberger '072 publication understood to add anything to the Henshaw '115 patent and/or the Peterlechner '048 patent that would make obvious the claimed invention.

For the above reasons, Applicants submit that claims 1, 29 and 39 are allowable over the cited art. Claims 2, 20-28 and 30-38 depend from claims 1 and 29 and are believed

allowable for the same reasons. Moreover, each of the dependent claims recites additional features in combination with the features of its respective base claim, and is believed allowable in its own right. Individual consideration of the dependent claims respectfully is requested.

Conclusion

Applicants believe that the present Amendment is responsive to each of the points raised by the Examiner in the Official Action, and submit that the application is in condition for allowance. Favorable consideration of the claims and passage to issue of the application at the Examiner's earliest convenience earnestly are solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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